COMPUTING STUDY NOTES

Topic: Python Library Programs

Grade: 8

Subject: Computing

1. Overview of Python Libraries

A **library** (or **module**) in Python is a pre-written collection of code, functions, and constants that you can import into your program to reuse existing tools.

To use a module in your program, write the `import` statement at the top of your script:

```
import module_name
```

2. The `math` Module

The `math` module provides access to standard mathematical functions and constants.

Function / Constant	Description	Example Code	Output
`math.pi`	Returns the mathematical constant Pi (π ≈ 3.14159...).	`print(math.pi)`	`3.14159265...`
`math.floor(x)`	Rounds number `x` **down** to the nearest integer.	`math.floor(4.9)` `math.floor(-3.2)`	`4` `-4`
`math.ceil(x)`	Rounds number `x` **up** to the nearest integer.	`math.ceil(4.1)` `math.ceil(-3.8)`	`5` `-3`

```
import math # Calculating area of a circle: Area = pi * r^2 radius = 5 area = math.pi * (radius ** 2) print("Area of circle:", area) # Demonstrating rounding functions val = 7.35 print("Ceiling:", math.ceil(val)) # Output: 8 print("Floor:", math.floor(val)) # Output: 7
```

3. The `random` Module

The `random` module generates pseudo-random numbers and makes random choices.

Function	Description	Example Code	Output Range
`random.random()`	Returns a random float between `0.0` (inclusive) and `1.0` (exclusive).	`random.random()`	`0.0 ≤ x < 1.0`
`random.randint(a, b)`	Returns a random integer `N` such that `a ≤ N ≤ b` (both inclusive).	`random.randint(1, 6)`	Integer from `1` to `6`
`random.randrange(start, stop)`	Returns a random integer from range (stop value is excluded).	`random.randrange(1, 10)`	Integer from `1` to `9`
`random.choice(sequence)`	Selects a random element from a non-empty sequence (e.g., list, tuple).	`random.choice(['Red', 'Blue'])`	Single item from list

```
import random # Simulating a die roll die_roll = random.randint(1, 6) print("You rolled:", die_roll) # Picking a random item from a list fruits = ["Apple", "Banana", "Cherry", "Mango"] print("Selected fruit:", random.choice(fruits))
```

EXERCISE SHEET

Topic: Python Library Programs (math & random)

Total Questions: 20

Marks: 30

Section A: Multiple Choice Questions (1 Mark Each)

1. Which statement correctly imports the math module in Python?

A) `using math` B) `include math` C) `import math` D) `load math`

2. What is the value returned by `math.floor(8.99)` ?

A) `8.0` B) `8` C) `9` D) `8.9`

3. What does `math.ceil(3.01)` evaluate to?

A) `3` B) `3.0` C) `4` D) `4.0`

4. Which function returns an integer in a closed range [a, b] including both endpoints?

A) `random.random()` B) `random.randint(a, b)` C) `random.choice()` D) `math.ceil()`

5. Which method selects a random element from a given list `colors = ['Red', 'Green', 'Blue']` ?

A) `random.choice(colors)` B) `random.randint(colors)` C) `random.random(colors)` D) `math.choice(colors)`

Section B: Fill in the Blanks (1 Mark Each)

6. To use mathematical constants like Pi in Python, we access it using `math._____` .

7. The function `math.floor(-2.3)` outputs the integer _____.

8. The function `random.random()` returns a value strictly less than _____.

9. The function `math.ceil(7.0)` returns _____.

10. The output range for `random.randint(10, 20)` includes the minimum value _____ and maximum value _____.

Section C: Predict the Output (1 Mark Each)

11. Predict the output:

```
import math print(math.floor(5.8) + math.ceil(2.1))
```

12. Predict the output:

```
import math print(round(math.pi, 2))
```

13. Predict the output:

```
import math print(math.floor(-4.1))
```

14. Predict the output:

```
import random items = [10, 10, 10] print(random.choice(items))
```

15. Predict the output:

```
import random print(random.randint(5, 5))
```

Section D: Short Answer & Programming Tasks (2 Marks Each)

16. Write a single line of Python code to calculate the area of a circle with radius `r = 7` using `math.pi`.

17. Explain the difference between `math.floor()` and `math.ceil()` with one example each.

18. Write a Python snippet using the `random` module to simulate rolling a standard 6-sided die.

19. Write a Python script to select and print a random student name from a list containing: `["Alice", "Bob", "Charlie", "Diana"]`.

20. What will happen if you attempt to run `print(math.pi)` without writing `import math` first? Explain why.

Answer Key (For Self-Assessment)

Section A: 1. C | 2. B | 3. C | 4. B | 5. A

Section B: 6. `pi` | 7. `-3` | 8. `1.0` | 9. `7` | 10. `10, 20`

Section C: 11. `8` (5 + 3) | 12. `3.14` | 13. `-5` | 14. `10` | 15. `5`

Section D:

16. `area = math.pi * (7 ** 2)`

17. `math.floor()` rounds down to nearest integer (e.g., 3.8 → 3); `math.ceil()` rounds up to nearest integer (e.g., 3.1 → 4).

18. `import random; roll = random.randint(1, 6); print(roll)`

19. `import random; names = ["Alice", "Bob", "Charlie", "Diana"]; print(random.choice(names))`

20. Python will raise a `NameError` because the `math` module and its attributes are not loaded into memory until imported.